

Claims

1. An optical system comprising:
 - an illumination source producing an illumination beam;
 - a sample holding stage for holding a sample onto which the illumination beam is directed;
 - a first objective lens;
 - a second objective lens;
 - an objective lens mount onto which said first objective lens and said second objective lens are mounted, said mount allowing selective positioning one of said first objective lens and said second objective lens in a position to collect light from the sample and transmit collected light in a collected light beam;
 - a first imaging lens;
 - a second imaging lens;
 - an imaging lens mount onto which said first imaging lens and said second imaging lens are mounted, said mount allowing a user to selectively position one of said first imaging lens or said second imaging lens in a collected light beam path, wherein any selected objective lens and imaging lens combination become a selected lens pair, wherein any selected lens pair is optically symmetrical;
 - an area array detector, wherein light passing through said first or second imaging lens impinges on said area array detector; and
 - an imaging filter positioned between in the path of the collected light beam at a region of parallel light rays.
2. The system of claim 1, wherein the illumination source includes an arc lamp and a condenser lens.
3. The system of claim 2, wherein the illumination beam is directed by an optical fiber onto the sample.

4. The system of claim 1, further comprising an illumination filter placed in the path of the illumination light.
5. The system of claim 1, further comprising an illumination filter holder that allows one of a plurality of illumination filters to be positioned in the path of the illumination light.
6. The system of claim 1, wherein the area array detector is a charge coupled diode device.
7. The system of claim 1, wherein the area array detector is selected from the group consisting of a CCD detector, a CID detector, a CMOS detector or a photodiode array detector.
8. The system of claim 1, wherein said imaging filter is one of a plurality of imaging filters mounted on an imaging filter holder, such that said filter may be selectively rotated into the pathway of the collected light beam.
9. The system of claim 1, wherein said system includes three objective lenses held by the objective lens mount and three imaging lenses held by the imaging lens mount.
10. The system of claim 9, wherein said objective lens mount and said imaging lens mount are each on a turret.
11. The system of claim 1, wherein said sample holding stage may be selectively moved along a z-axis.
12. The system of claim 1, further including an autofocus system.

13. The system of claim 12, wherein said autofocus system includes a laser directed onto a reflective substrate on the sample holding stage, an array detector positioned to detect the reflected light, and a processor, wherein said processor determines the focus on the substrate by the location on the array detector to which reflected light is detected.

14. The system of claim 1, wherein said stage includes an adapter held on said stage.

15. The system of claim 1, further including a system processor.

16. The system of claim 1, wherein said first objective lens, said second objective lens, said first imaging lens and said second imaging lens are all Cooke triplet lenses.

17. An optical system comprising:

- an illumination means producing an illumination beam;

- a sample stage for holding a sample substrate;

- an illumination filter positioned such that the illumination beam is directed through the illumination filter and onto a sample on the sample stage;

- an objective lens turret holding a plurality of objective lenses, wherein each objective lens may be selectively positioned by rotation of the turret to collect light excited by said illumination beam; wherein when each objective lens is selectively positioned by said turret to collect light, said objective lens is held at a focal length distance from a stage position of the sample stage;

- an area array detector;

a imaging lens turret holding a plurality of imaging lenses, wherein each imaging lens may be selectively positioned by rotation of the turret in a pathway of collected light transmitted by said by an objective lens; wherein when each imaging lens is selectively positioned by said turret in the path of collected light, said imaging lens is held at a focal length distance from an imaging surface of said area array detector;

wherein any selected pair of objective lens and imaging lens is optically symmetrical.

18. The system of claim 17, wherein the illumination means provides off axis illumination.

19. The system of claim 17, wherein the illumination means provides on axis illumination directed to said sample stage by means of a dichroic mirror.

20. The system of claim 17, further comprising an illumination filter holder that allows one of a plurality of illumination filters to be positioned in the path of the illumination light.

21. The system of claim 17, wherein the area array detector is selected from the group consisting of a CCD detector, a CID detector, a CMOS detector or a photodiode array detector.

22. The system of claim 17, wherein said imaging filter is one of a plurality of imaging filters mounted on an imaging filter holder, such that said filter may be selectively rotated into the pathway of the collected light beam.

23. The system of claim 17, wherein said objective lens turret holds three objective lenses and said imaging lens turret holds three imaging lenses.

24. The system of claim 17, wherein said sample holding stage may be selectively moved along a z-axis.

25. The system of claim 17, further including an autofocus system.

26. The system of claim 25, wherein said autofocus system includes a laser directed onto a reflective substrate on the sample holding stage, an array detector positioned to detect the reflected light, and a processor, wherein said processor determines the focus on the substrate by the location on the array detector to which reflected light is detected.

27. The system of claim 17, wherein said all objective lenses and all imaging lenses are all Cooke triplet lenses.